

## POLICY RESEARCH WORKING PAPER

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# Trade Reform Design as a Signal to Foreign Investors

## Lessons for Economies in Transition

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The design of trade policy reform can encourage or discourage foreign direct investment by revealing the government's commitment to protect the interests of foreign investors. The optimal policy is analyzed under four scenarios. These involve whether the investment is reversible or not, and whether government preferences are or are not initially known by foreign investors.



## Summary findings

A few years ago, many Western companies were eager to consider investing in Eastern Europe and, more recently, in South Asia, where ongoing reform, large domestic markets, and cheap but qualified labor are transforming the region into a potentially fierce competitor for foreign direct investment (FDI).

Although this growing interest was reflected in large commitments by foreign investors in countries announcing major FDI reforms, actual disbursements have been modest. This reflects the investors' concern about the credibility of governments' long-term commitment to change.

The credibility of policy announcements is important to investors because the returns from the sunk investment can be affected by later changes in policy. To reduce investors' concern, governments can send clear signals to show their commitment to change.

The achievements of trade reform can be an effective indicator of a government's commitment to change as indicated by the strong correlation between increases in trade flows and increases in FDI disbursements.

Bond, Chiu, and Estache examine how countries can design trade reform to speed up increases in trade. Countries can tailor their commitment to reform to foreign investors by targeting the design of these instruments to the source of their credibility problem.

Governments face two credibility problems: (1) investors know the current government's policy preferences (whether they are protectionist or free trade-oriented) but ignore those preferences if the government will later have an incentive to change its position, and (2) investors are uncertain about actual government preferences and have reason to doubt the government's commitment to a reform program.

The model presented in the paper shows that the recommendations in favor of free trade prevail when investors know the government's preferences and the government is able to lock itself into its commitment to change.

But in the most realistic scenario in which investors do not know the government's preferences and the policymakers cannot otherwise demonstrate their commitment to reform, a government actually committed to change may want to signal this commitment by subsidizing investments or imports if it wants to be competitive in the market for FDI.

In this model, the quickest way to attract FDI is through an investment subsidy, but it is also the most costly—an important consideration for a reforming government trying to keep tight fiscal control.

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Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Antonio Estache, room 17-137, telephone 202-458-1442, fax 202-522-5134, internet address AESTACHE@WORLD BANK.ORG (29 pages), July 1995.

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**Designing Trade Reform as a Signal to Foreign Investors**

**Lessons for Economies in Transition**

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## I. Introduction

A few years ago, many western companies were eager to consider investment in Eastern Europe and more recently in South Asia where ongoing reforms, large domestic markets and cheap but qualified labor are transforming the region in a potentially fierce competitor on the market for foreign direct investment (FDI). While large commitments by foreign investors to these parts of the world reflect this growing interest, actual disbursements have been much more modest. Why is that? Because investors are concerned with the government's long term commitment to change. The Washington Post, for instance, recently quoted an international investment expert saying that in Russia the main concern is to know who will be in power in a couple of years.<sup>1</sup>

The credibility of policy announcements is important for foreign investors because once a firm has built a plant in a foreign country, the returns that the firm earns from the sunk investment can be affected by subsequent changes in government policy. For example, suppose that tariff reform is a crucial component of the profitability of a project in a developing country. If the investor believes that the reform program will not proceed as announced, then the investment may not take place. Thus, the risk of policy change may be a deterrent to foreign investors.

To reduce the investors' concern, governments can try to send clear signals to demonstrate their commitment to change. This paper examines how countries can do this through fiscal instruments.<sup>2</sup> The analysis focuses on the design of trade reforms as a signalling device to foreign investors. For many governments wishing to change their policy environment, an increase in the quantity of foreign investment may be an important component of the success of the program. This is why so often FDI regulation

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<sup>1</sup> Sitov, A. (199), "Why investors aren't rushing to Russia", The Washington Post, October 29, p. C1 and C2.

<sup>2</sup> See Dewatripont, M. and G. Roland (1992a and 1992b), on more detailed discussion of the importance of sequencing and political constraints for the design of reform packages. See also the various papers by Rodrik on the design of trade reform.

reform begins early on in the overall reform process as in India or for instance. However, foreign investors tend to wait for effective indicators of a government's commitment to change before disbursing. Trade reform is probably as good an indicator as any for FDI and Katseli for instance shows that trade tends to "Granger-causes" FDI and explains it by the export orientation of foreign operated firms in many developing countries.<sup>3</sup> Therefore, it will be important for the government to design a trade reform that will make the FDI reform more credible.

The rest of the paper is organized as follows. Section II discusses the two basic types of environment in which government promises may lack credibility. The first is when the government may not be able to commit to some actions which will be undertaken after the economic agent has made an irreversible decision. Its implications for the optimal design of trade policy is discussed in Section III. The second source of credibility problem for the government relates to the uncertainty of the investors about the long term policy preferences of the government. This is being addressed in Section IV. Section V summarizes the policy conclusions.

## II. Sources of Lack of Government Credibility

There are two main reasons why a government may lack credibility. The first is that it cannot commit to its policy actions because these will take place after the private agents have locked themselves into some decision. Consider a government's commitment to a foreign investor regarding the tax rate that it will charge. The government and the firm may negotiate a tax rate prior to the entry of the firm. However, once the firm has built its plant, the country could renege on its promises without driving the firm out of the country because the firm's investment is sunk. The belief that a promised tax rate may

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<sup>3</sup> Katseli, L. (1992), FDI and trade interlinkages in the 1980s: experience and prospects of developing countries, CEPR working paper #687, July

be reneged on once the firm enters the country could deter the firm from entering the country, even though the investment would be beneficial to the country. The government ends up worse off because of its inability to commit when agents are forward-looking. Since its future actions are anticipated by agents, they will take actions which are socially inefficient to protect themselves against the anticipated future choices of the government. Therefore, there will be efficiency gains available to the government if it can commit itself to its future policies.

The second case in which the design of policies may affect the credibility of government policy announcements occurs when the firm is uncertain about the preferences of the government, i.e. is the government free trade oriented or is it fundamentally protectionist but acting in the short run as free trade oriented to achieve specific objectives. In this case the government more favorable to the foreign investor may attempt to signal its type through the design or speed of implementation of its policies. For example, Bond and Samuelson (1986) argue that a tax holiday may be used as a signal by a country that will be a profitable location for the investor. This reduced tax is a worthwhile inducement in a profitable country, where the firm will remain and pay taxes in the future. The tax holiday will be too costly for an unprofitable country, however, because the firm will not stay around and pay taxes in the future once it discovers that the business environment is not favorable.

Similarly, Rodrik (1989) argues that countries that are committed to trade liberalization may in fact liberalize more rapidly than is optimal in order to separate themselves from countries that are not committed to reform. In his scenario, a country announces that it will liberalize trade in order to obtain a loan. The government that is committed to maximizing national income will continue with liberalization in the second period because it is the optimal policy. A government that wants to use tariff revenue to achieve an income redistribution target will allow liberalization only in the first period in order to get the loan, since the liberalization makes it more difficult for the government to achieve its redistributive goal. In the second period, the government will renege on its promise. By raising the speed of first period

liberalization beyond the optimal rate, the national-income maximizing government can make it too costly for the redistributive government to mimic its policy, and thus convince the investors that it will continue with the liberalization policy. Section IV considers the case in which the credibility problem of tariff reform is associated with uncertainty about whether the government is a free trade or protectionist government.

### III. Tariff Reform and Time Consistency

To analyze the issue of time consistency of a tariff reform with foreign investment, we consider a two period, two sector model with sector-specific capital. We begin by specifying the production model, and then derive the optimal policy for the host country when it can commit to its tariff rates prior to the time at which initial foreign investment decisions are made. We then illustrate how welfare is affected if the host country is unable to commit to its tariff rate.

#### A. The Production Model

In this section we introduce the production model, and derive the effects of a tariff on the income of factor owners and the level of foreign investment. Consider a one period two sector model with sector-specific capital. Sector M produces import-competing goods using sector specific capital ( $K_M$ ) and labor ( $L_M$ ), and sector X produces the exportable good using sector-specific capital ( $K_X$ ) and labor ( $L_X$ ). Labor is mobile between sectors, so that labor market equilibrium requires that  $L_X + L_M = \bar{L}$ , where  $\bar{L}$  is the fixed endowment of labor. There is a fixed endowment of capital in sector M,  $\bar{K}_M$  which is owned by host country residents. Capital in sector X is specific to sector X, but is potentially mobile internationally. The endowment of domestically owned capital is denoted,  $\bar{K}_X$ , and the quantity of foreign investment is  $Z$ . The use of the sector-specific capital model to deal with foreign investment captures



the notion that foreign investment takes place because of sector-specific knowledge, such as technology and managerial expertise, that can be applied to production processes in foreign countries.<sup>4</sup>

We assume that the host country is too small to affect world prices which a reasonable assumptions for most reforming countries in Eastern Europe for instance. We also normalize by setting the world price of each good equal to unity. The domestic price of the importable will then be  $p = (1 + \tau)$ , where  $\tau$  is the ad valorem tariff. The effects of a tariff in the one period model where the quantity of foreign investment is fixed at  $Z$  are well known.

In a one period model, treating the quantity of foreign investment as given, an increase in the tariff increases the wage but by an amount less than the percentage increase in the tariff. The impact of the tariff on the real return to labor will thus depend on the share of the importable in the consumption bundle of labor. The increase in the wage results in a fall in the return to capital in sector X. In sector M, the real return to capital ( $r_M/p$ ) rises as a result of the tariff because the real cost of labor ( $w/p$ ) is reduced by the tariff. The fact that an increase in the tariff reduces the return to foreign capital creates the possibility that the host government might use tariffs to extract rents from foreign investors. The effects of an increase in foreign investment on factor returns can also be seen in the labor market equilibrium. An increase in  $Z$  raises the productivity of labor in the exportables sector. This results in an increase in the wage rate, and a decline in the returns to specific capital in both sectors.

Since the emphasis here is on the time consistency problem and how it is affected by the irreversibility of foreign investment decisions, we will use a two period model to examine the foreign investment decision. This allows us to examine the location decision of foreign investors and endogenizes the level of foreign investment.

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<sup>4</sup> This approach is consistent with the observation that direct foreign investment is much more common in sectors characterized by the importance of technology, product differentiation, and other forms of sector-specific knowledge on the part of firm owners.

The host country endowments of factors,  $(\bar{L}, \bar{K}_X, \bar{K}_M)$  are assumed to be the same in each time period.<sup>5</sup> In each period, the revenue function,  $R(\bar{K}_M, \bar{K}_X + Z, p)$  gives the maximum income attainable at given factor endowments and domestic prices. Under the assumption of constant returns to scale in production and competition in factor and output markets,  $R$  will be concave in the factor supplies and convex in the price of the importable. In addition,  $R_p = Y_M$  is the output of the importable and  $R_Z = r_X$  the marginal product of capital in sector  $X$ .

At the beginning of period 0, foreign investors choose  $Z_0$ , the quantity of capital to locate in the host country. Foreign investment undertaken in period 0 is assumed to be irreversible, which implies  $Z_0 \leq Z_1$ . The home (source) country return on capital in period  $i$  is denoted  $r_i^*$ . The host country is assumed to be small in both goods and capital markets, so that home country return to capital is unaffected by host country policies. Letting  $\delta$  be the investor's discount on period 1 returns, foreign investors will invest up until the point at which the return to capital is located in each country is equalized. This condition is

$$V_0 = r_{X0}(p_0, Z_0) + \delta r_{X1}(p_1, Z_1) = r_0^* + \delta r_1^*. \quad (1)$$

Note that  $r_{X1}$  in (1) is the investor's expected future return, which will be determined by the investor's expectations regarding  $p_1$  and  $Z_1$ . We will assume that investor's expectations are rational. In period 1, the investor will choose to locate additional capital in the host country if  $r_{X1}(p_1, Z_0) > r_1^*$ . If  $r_{X1}(Z_0) < r_1^*$ , no investment will take place in the period 1. This yields the condition for the return on foreign investment to be

$$r_{X1}(p_1, Z_1) \leq r_1^*, \quad (2)$$

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<sup>5</sup> We simplify by abstracting from investment in other factors and treating their supplies as fixed, in order to concentrate on the location decision for foreign investment. The model can easily be extended to the case in which there is accumulation of sector-specific factors.

with strict equality holding if  $Z_1 > Z_0$ .

The response of foreign investment to a change in the tariff can be determined using (1) - (2).

There are two cases to consider: is the irreversibility of investment constraint binding or is it not?

If the irreversibility constraint is binding ( $Z_0 = Z_1$ ), then the impact of tariffs is determined by total differentiation of (1) with  $Z_0 = Z_1$  to be

$$\frac{\partial Z_0}{\partial \tau_0} = -\frac{R_{Zp}^0}{R_{ZZ}^0 + \delta R_{ZZ}^1} < 0 \quad \frac{\partial Z_0}{\partial \tau_1} = -\frac{\delta R_{Zp}^1}{R_{ZZ}^0 + \delta R_{ZZ}^1} < 0 \quad \text{for } Z_0 = Z_1 \quad (3a)$$

When the irreversibility constraint is binding, an increase in the period 1 tariff drives down the return to capital in period 1 ( $r_{x1} < r_1^*$ ). This discourages investment in period 0, because foreign investors take into account that the future tariff will reduce the return on capital. <sup>6</sup>

If the irreversibility constraint is not binding, then  $Z_0 < Z_1$  and (1) and (2) can be solved to yield:

$$\frac{\partial Z_t}{\partial \tau_t} = -\frac{R_{Zp}^t}{R_{ZZ}^t}; \quad \frac{\partial Z_t}{\partial \tau_s} = 0 \quad t = 0, 1; s \neq t, \text{ and } Z_0 < Z_1 \quad (3b)$$

Increases in the tariff rates discourage investment in the period in which they are imposed. Note however, that there is no impact of the period 1 tariff on period 0 investment in this case. This is due to the fact that when period 1 investment takes place, the period 1 return is  $r_1^*$  from (2) regardless of the

<sup>6</sup> The competitive profit condition for sector X requires that  $w$  and  $r_x$  be such that

$$c_x(w, r_x) = 1 \quad (i),$$

where  $c_x$  is the unit cost function. When the irreversibility constraint is not binding,  $r_x = r^*$  regardless of the level of the tariff and the wage rate is unaffected by the tariff.

When the irreversibility discussion is binding, a tariff in period 0 causes a decline in the amount of capital in both periods. In period 1, the labor demand schedule in sector M is unaffected but the labor demand schedule for X will shift down. Therefore, the period 1 wage will fall and  $r_{x1}$  will rise as a result of the tariff. Since  $r_{x1}$  rises, (4a) indicates that  $r_{x0}$  must fall and the wage rate in period 0 must rise.

level of the period 1 tariff.

### B. Domestic Expenditure and National Welfare

Domestic demand is derived from maximization of the intertemporal utility function

$$W \equiv U(D_{0X}, D_{0M}) + \beta U(D_{1X}, D_{1M}), \quad (4)$$

where  $D_{ij}$  is consumption of good  $j$  in period  $i$ . If we assume that domestic residents have access to international capital markets, with  $\delta$  denoting the market discount factor on future income, the period 1 (present value) domestic prices of the exportable and importable will be  $\delta$  and  $\delta(1 + \tau_1)$  respectively. The preferences of consumers can then be characterized by the expenditure function  $E((1 + \tau_0), \delta, \delta(1 + \tau_1), W)$ . The expenditure function is concave in prices and non-decreasing in utility. Differentiation with respect to the prices of the importables yields the compensated import demand functions,  $\partial E / \partial p_{Mi} = E_{Mi} = D_{Mi}((1 + \tau_0), \delta, \delta(1 + \tau_1), W)$  for  $i = 0, 1$ . The budget constraint of the host country requires that expenditure at domestic prices equal the value of production and tariff revenue, less payments to foreign capital owners.

$$E((1 + \tau_0), \delta, \delta(1 + \tau_1), W) = R^0(Z_0, \tau_0) + \tau_0(D_{M0}((1 + \tau_0), \delta, \delta(1 + \tau_1), W) - Y_{M00}((1 + \tau_0), Z_0)) - r_{X0}((1 + \tau_0), Z_0) Z_0 + \delta[R^1(Z_1, \tau_1) + \tau_1(D_{M1}((1 + \tau_0), \delta, \delta(1 + \tau_1), W) - Y_{M10}((1 + \tau_1), Z_1)) - r_{X1}((1 + \tau_1), Z_1)Z_1] \quad (5)$$

The relationship between tariff rates, foreign investment, and host country welfare can be established using (5). Totally differentiating (5) yields

$$E_W dW + \sum_{t=0}^1 E_{p_t} d\tau_t = \sum_{t=0}^1 \delta^t \left( R_Z^t - r_{Xt} - Z_t \frac{\partial r_{Xt}}{\partial Z_t} - \tau_t \frac{\partial Y_{Mt}}{\partial Z_t} \right) dZ_t + \sum_{t=0}^1 \left[ \delta^t \left( D_{Mt} - Y_{Mt} + R_p^t + \tau_t \left( \frac{\partial D_{Mt}}{\partial p_t} - \frac{\partial Y_{Mt}}{\partial p_t} \right) - Z_t \frac{\partial r_{Xt}}{\partial p_t} \right) + \tau_s \delta^s \left( \frac{\partial D_{Mt}}{\partial p_s} \right) \right] d\tau_t$$

where  $s = 0, 1$  and  $s \neq t$ , and the superscripts on the revenue functions denote the time periods. Since capital markets are assumed to be competitive, the local rental on capital in period  $t$ ,  $r_{kt}$ , will equal the marginal product of capital at domestic prices in period  $t$ ,  $R_z$ . This yields  $\partial r / \partial p = R_{zp}$  and  $\partial r / \partial Z = R_{zz}$ . Similarly,  $E_p = D_M$  and  $R_p = Y$  implies  $\partial D_M / \partial p = E_{pp}$ ,  $\partial D / \partial W = E_{pw}$ ,  $\partial Y / \partial p = R_{pp}$  and  $\partial Y / \partial Z = R_{pz}$ . Substituting these results yields

$$dW = \alpha \sum_{t=0}^1 \{ - [Z_t R_{zz}^t + \tau_t R_{pz}^t] dZ_t - [\delta^t (Z_t R_{pz}^t - \tau_t (E_{p_t p_t} - R_{pp}^t)) - \tau_s \delta^s E_{p_t p_s}] d\tau_t \}, \quad (6)$$

$$\text{where } \alpha \equiv [E_w - \tau_1 E_{p_1 w} - \delta \tau_2 E_{p_2 w}]^{-1} > 0$$

We first discuss the effect of  $\tau$  and  $Z$  on welfare, treating the level of foreign investment as exogenously determined. The first term in brackets is the effect of an increase in the quantity of foreign investment on welfare in period  $t$ . An inflow of capital lowers the return to foreign investors ( $\partial r / \partial K = R_{zz} < 0$ ) and causes a decline in the production of the import-competing good ( $\partial X_M / \partial Z = R_{pz} < 0$ ). The former effect results in an improvement in the terms on capital purchased from foreigners. The latter effect will result in an increase in welfare when  $\tau > 0$ , because an increase in the capital inflow shifts resources toward the exportable sector. The second term in brackets is the effect of the tariff on welfare. Since an increase in the tariff reduces the return to foreign capital ( $\partial r_x / \partial p = R_{pz} < 0$ ), the tariff has a favorable effect of redistributing income from foreign capital owners to domestic factor owners. However, an increase in the tariff has the effect of reducing the volume of imports ( $\partial (D_M - Y_M) / \partial p = E_{pp} - R_{pp} < 0$ ), which reduces welfare when the  $\tau > 0$  because the quantity of imports is below the socially optimal level.

The overall effect of a tariff includes both its direct effect, which is captured by the second term in (6), and the indirect effect resulting from its impact on the quantity of foreign investment. Note that the direct effect of the tariff includes the terms of trade effect on capital, which provides an incentive for the government to impose a tariff to drive down the payment to foreign capital. However, (6) indicates that the tariff will also drive out foreign capital, which has a negative effect on host country welfare. We first examine this question in the case in which the host country can commit itself to a period 1 tariff rate prior to the entry of investors in period 0.

### C. Optimal Policy with Host Country Commitment to Tariff Rates

If the host country can commit to the tariff it will charge in period 2, then the tariffs are chosen to at time 0 to maximize host country welfare. The necessary conditions for a maximization of domestic welfare are obtained by setting  $\partial W/\partial \tau_i = 0$  in (6), making use of  $\partial Z_i/\partial \tau_j$  from (4). This yields the following result:

**Proposition 1:** For a host country that can commit to its tariffs, the optimal policy is free trade ( $\tau_0 = \tau_1 = 0$ ).

To verify this result, note that at  $\tau_i = 0$  in (6) the trade volume effects of the tariff are zero. The only effect of the tariff in period  $i$  results from its impact on the return to foreign capitalists ( $Z_i R_{pz}^i d\tau_i$ ), and the resulting effect of the tariff on the volume of foreign investment ( $-\Sigma Z_i R_{zz}^i$ ). However, it can be seen from (4) that these two effects will exactly cancel out. This result holds for both the case in which there is positive investment in period 1 and the case where  $r_{x1} < r_1^*$ . Therefore,  $\partial W/\partial \tau_i = 0$  at  $\tau_0 = \tau_1 = 0$ .

The optimality of free trade results from the small country assumption. Since the country is unable to affect its terms of trade in either goods or capital, the world prices represent the social cost of the traded goods and factor services. Efficiency dictates that these prices be used in resource allocation.

In particular, note that there is no incentive for the country to use the period 1 tariff to redistribute income from foreign investors to domestic residents in the case where the irreversibility constraint is binding. This is due to the fact that if the country uses a tariff to drive down the period 1 return, investors will invest less capital in period 0. Period 0 investment falls until the point where  $r_{x0}$  has risen sufficiently to restore equality in (1).<sup>7</sup>

#### D. Optimal Host Country Policy Without Commitment

We now consider the case where the government cannot commit to its future tariff rate. This means that whatever announcement the government makes at time 0 concerning the tariff rate, foreign investors believe that government will set  $\tau_1$  to maximize welfare at that time. The question is then whether a government that has announced a free trade policy at time 0 will have an incentive to carry out the policy at time 1.

At time 1, the government chooses its policy to maximize  $U^1(D_{M1}, D_{X1})$ . It is possible to define an expenditure function  $E^1(\tau_1, U^1)$  corresponding to the period 1 utility function  $U^1$ . The budget constraint

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<sup>7</sup> A slight modification is needed in this result for the case where the country cannot borrow on international capital markets. If there is investment in period 1 under free trade, then free trade continues to be the optimal policy when the firm cannot borrow on international capital markets. If there would not be any investment in period 1 under free trade, then it can be shown that the optimal policy is a tariff at time 0. In this case the government uses its tariff policy to borrow from the firm: it forces down the return of the at time 0, which results in a higher return to the foreign investors at time 1 to maintain the investment condition (1). This intertemporal reallocation of the returns from the investment is equivalent to a loan from the firm to the government. Note that this is not an efficient form of loan, because it distorts the trade pattern.

in period 1 requires that expenditure be no larger than period 1 net income less debt repayment on period 0 loans.

$$E^1(\tau_1, U^1) = R(Z_1, \tau_1) + \tau_1(D_{M1} - Y_{M1}) - r_{X1}Z_1 - B/\delta \quad (7)$$

Totally differentiating (7) yields

$$dU^1 = \alpha_1 \{ [Z_1 R_{KK}^1 + \tau_1 R_{pK}^1] dZ_1 - [Z_1 R_{pK}^1 - (\tau_1 (E_{pp}^1 - R_{pp}^t))] d\tau_1 \}, \quad (8)$$

$$\text{where } \alpha_1 = E_U^1 - \tau_1 E_{pU}^1 > 0$$

. Note that this welfare decomposition is similar to that obtained for the two period problem (6).

The optimal policy for the host country is obtained by choosing the value of  $\tau_1$  at which (8) is equal to 0, where  $\partial Z_1 / \partial \tau_1$  is given by (4). Substitution of (5) into (7) yields the following result:

**Proposition 2:** If the host government cannot commit to a period 1 tariff, the optimal policy will be

- (a) a tariff if the irreversibility condition binds
- (b) free trade if investment is taking place in period 1.

To establish (a), note that when  $r_{X1} \leq r_1^*$ ,  $\partial Z_1 / \partial \tau_1 = 0$ . The optimal tariff will then be the value at which the second term in (8) is equal to zero. At  $\tau = 0$ , we then have  $\partial U^1 / \partial \tau_1 = -\alpha_1 Z_1 R_{pK}^1 > 0$ . Since the quantity of foreign investment is fixed, the host country can extract surplus from foreign investors by imposing a tariff. The tariff results in an income redistribution from foreign investors to domestic residents. The optimal tariff trades off the gain in income due to the income redistribution against the loss in welfare from the trade distortion. If investment is taking place in the second period, then  $\partial Z_1 / \partial \tau_1 < 0$  from (5b). In this case the tariff discourages foreign investors, and the optimal policy is free trade.



Thus, free trade will be a credible policy in this case if  $Z_1 > Z_0$  at  $\tau_1 = 0$ . If the revenue functions in each period are the same and the rental available in the rest of the world were the same in each period ( $r_0^* = r_1^*$ ), then we would obtain  $Z_0 = Z_1$  at free trade and free trade would not be a credible policy. However, if the host country were experiencing growth in endowments that raised the productivity of foreign investment over time, we would expect  $Z_1 > Z_0$  and free trade would be credible.

The possibility that free trade is not a credible policy arises because of the temptation for the government to use its policy to extract rents from fixed foreign investment. Free trade will be credible in situations where changes in the tariff will result in a loss in foreign investment to the host country, thus eliminating the incentive to alter the tariff.<sup>8</sup>

#### IV. Credibility with Uncertainty about Government Type

In the case of time consistency, the foreign investor is assumed to know the preferences of the government. Therefore, the investor knows the government's optimal tariff choice in the second time period, which we denote  $\tilde{\tau}_1$ . In this section we examine the credibility problem that arises when the investor is not certain about the type of government that it is facing.

For example, suppose that there are two types of government. One type is a government whose objective is to maximize national income, as developed in the previous section. We assume that the

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<sup>8</sup> This result is similar to that obtained in the literature on the taxation and expropriation of foreign investment. Worrall and Thomas (1989) show that an incentive compatible scheme can be designed in which the presence of future investment by the firm prevents the government from expropriating. An inefficiency arises because for some parameter values the firm will underinvest in early periods to deter the country from expropriating. The investment level is set to make the country indifferent between the current returns of expropriating the entire capital stock the future tax payments that will be made if the firm is allowed to continue production. A lower current investment level reduces the incentive to expropriate.

conditions are met under which a national income maximizing government would find free trade to be the time consistent policy, so we will refer to this as the free trade government. Its optimal policy is  $\tilde{\tau}_0 = \tilde{\tau}_1 = 0$ . We denote its welfare function

$$W^F(\tau_0, \tau_1) = W^F(\tau_0, \tau_1, Z_0(\tau_0, \tau_1), Z_1(\tau_0, \tau_1)).$$

The other type of government is the protectionist government. The protectionist government is assumed to be overly influenced by the interest of factor owners in the import-competing sector. The objective function for the protectionist government can be expressed as

$$W^P(\tau_0, \tau_1) = W^F(\tau_0, \tau_1) + \gamma \Pi(\tau_0, \tau_1), \quad (9)$$

$$\text{where } \Pi(\tau_0, \tau_1) = r_{M0}(\tau_0, Z_0(\tau_0, \tau_1)) + \delta r_{M1}(\tau_1, Z_1(\tau_0, \tau_1))$$

is the present value of the return to the specific factor owner and  $\gamma > 0$ . We have  $\partial r_M / \partial \tau > 0$  and  $\partial r_M / \partial Z < 0$ . Since  $\partial Z / \partial \tau \leq 0$ , a tariff has two favorable effects on the return to specific factors in the import-competing sector. The direct effect results from the increase in the price of output, while the indirect effect is due to the decline in the wage rate resulting from the outflow of foreign investment. Therefore,  $\partial W^P(0,0) / \partial \tau_i > 0$  and the optimal tariffs for the protectionist government will be positive. We denote these tariffs  $\tilde{\tau}_0^P, \tilde{\tau}_1^P > 0$ .

Under these assumptions, the protectionist government would never announce a tariff reform. However, Rodrik (1987) has pointed out that if an international agency makes an offer of loans or transfers in return for tariff reform, it might be in the interest of the protectionist government to announce a free trade policy in order to receive the aid. We will consider the case in which the agency makes a transfer to the country of  $T_0$  in period 0 in return for a trade reform in period 0. The government cannot commit itself to the period 1 tax rate, so the protectionist government will abandon the trade reform in period 1 and levy its optimal tariff  $\tilde{\tau}_1^P$ . The free trade government will maintain the free trade policy in period 1.

### A. The Foreign Investment Decision

Foreign investors earn a return of  $R_K^1(0, Z_0)$  in period 0. In period 1, foreign investors earn  $R_K(0, Z_1^F)$  if the government is type F and  $R_K(\tau_1^P, Z_1^P)$  if the government is type P, where  $Z_1^i$  is the period 1 investment when the government is type  $i$ . As noted above, we assume that there is no tariff in period 1 and positive investment takes place if the government is type F, so the return is  $r_1^*$  in this case (from (3)). If the government is type P, an optimal tariff will be chosen by the protectionist government to maximize (9), given the value of  $Z_0$  from period 1. Note that since  $R_{ZP} < 0$  this tariff will lead to a lower return on foreign investment, given  $Z = Z_0$ , than would be obtained under F government that imposes no tariff. This leads to two possibilities for the second period return on foreign investment, depending on whether or not the irreversibility condition binds. If  $R(\tilde{\tau}, Z_0) < r_1^*$ , then there will be no additional investment in the second period when the government is discovered to be protectionist. Note there are two possibilities. Letting  $\pi$  be the probability that investors assign to the government being type P, the condition for period 0 investment is

$$R_K(0, Z_0) + \delta[\pi R_K(\tau_1^P, Z_0) + (1-\pi)r_1^*] = V_0^* \quad (10)$$

If the irreversibility constraint is not binding, then the second period return on foreign investment will not be affected by the discovery that the government is type G. In this case, the period 0 investment decision is unaffected by  $\pi$ .

We will concentrate on the case in which the irreversibility constraint is binding in the second period, so that (10) determines the level of first period investment. Inverting (10) yields a solution for the level of foreign investment,  $Z_0(\tau_0, \tau_1^P, \pi)$ , which has the properties

$$\frac{\partial Z_0}{\partial \tau_1^P} = -\frac{\delta \pi R_{KP}^0}{R_{KK}^0 + \delta \pi R_{KK}^1} < 0 \quad \frac{\partial Z_0}{\partial \pi} = \frac{\delta (r_1^* - R_K^1(\tau_1^P))}{R_{KK}^0 + \delta R_{KK}^1} < 0 \quad (11)$$

An increase in  $\pi$  reduces the amount of investment that takes place, since it lowers the expected return to foreign investors.

Condition (10) establishes that the level of investment will be dependent on the investors' beliefs about the government's type. This means that the government's welfare function will now depend on  $\pi$ , since welfare can be written as  $W^i(\tau_0, \tau_1, Z_0(\tau_0, \tau_1, \pi), Z_1(\tau_0, \tau_1, \pi)) \equiv W^i(\tau_0, \tau_1, \pi)$ . From (4),  $\partial W / \partial Z_i = -Z_i R_{ZZ}^i > 0$  when evaluated at  $\tau_1 = 0$ . Utilizing (11), this means that  $\partial W_F(0, 0, \pi) / \partial \pi < 0$ , since a greater likelihood that the government is protectionist reduces the amount of investment, which is undesirable for a free trade government. Free trade governments will find it costly if they are confused with protectionist governments, since it will make it more difficult for them to attract foreign investment.

### B. Equilibrium in the Signalling Game

We assume that the game between the governments and the foreign investors proceeds as follows. Governments, who have private information about their types, move first and announce a trade policy prior to period 0. Foreign investors then choose their level of investment, and the international agency makes a transfer of  $T$  if the country has chosen a free trade policy. In period 1, the governments choose a value of  $\tau_1$  and foreign investors then make their choice of  $Z_1$ .

An important aspect of this problem is that the foreign investment decision depends on the beliefs about the government's type. Since the government moves first and the government is the agent with the private information, this can be analyzed as a signalling game because the foreign investors may be able to infer something about the government's type from the government's choice of  $\tau_0$ . We will adopt the concept of sequential equilibrium to analyze this game, as this is a widely accepted technique for

analyzing games of this type.<sup>9</sup> Signalling games generally have two types of equilibria, pooling equilibria and separating equilibria. A separating equilibrium is one in which type F governments choose a policy  $\tau_0^F$ , type P governments choose a policy  $\tau_0^P$ , and investors beliefs have beliefs such that  $\pi(\tau_0^F) = 0$  and  $\pi(\tau_0^P) = 1$ . This will be a sequential equilibrium if these policies are optimal for the governments, given the beliefs of the investors. A pooling equilibrium is one in which a common trade policy  $\tau_0$  is chosen by both types of governments, and  $\pi(\tau_0) = \bar{\pi}$ , where  $\bar{\pi}$  is the fraction of type P governments in the population.

We begin by illustrating an example in which a pooling equilibrium exists in which both types of governments choose a free trade policy in period 0. Suppose that the beliefs of investors are such that any government that imposes a positive period 0 tariff is assumed to be a protectionist government ( $\pi(\tau_0) = 1$  if  $\tau_0 > 0$ ) and a government which chooses  $\tau$  any other tariff is assumed to be protectionist with probability  $\bar{\pi}$ . These beliefs will be consistent with a pooling equilibrium if given these beliefs, it is optimal for both types of governments to choose  $\tau_0 = 0$ .

The problem for the P government is that a pooling equilibrium will occur if it earns higher welfare by announcing a free trade policy and receiving aid than it does by choosing its optimal tariff and forgoing the aid. This condition is more likely to be satisfied the greater is the value of aid, since this increases the incentive to pursue the free trade policy. One would also expect that it is more likely to occur the lower the value of  $\gamma$ , since a less protectionist government will face a lower cost of choosing a free trade policy.

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<sup>9</sup> A sequential equilibrium will consist of a set of beliefs,  $\pi(\tau_0)$ , which characterize the investors' beliefs about the government's type given the trade policy chosen, and a set of strategies for the players (trade policies for governments and investment levels for investors). These strategies must be sequentially rational, in the sense that they maximize the welfare of the players at each stage of the game, given the beliefs. Furthermore, the beliefs and strategies must be consistent, in that the beliefs at any point in the game which is reached with positive probability must be consistent with updating according to Bayes rule.

It can be shown that with these beliefs, the free trade government will also choose free trade.<sup>10</sup> This establishes that a pooling equilibrium will exist with these beliefs if the condition just described is satisfied. Note that in the pooling equilibrium, the F government is hurt by the fact that the amount of foreign investment is reduced (relative to the case with  $\pi = 0$ ) by the likelihood that the government is protectionist. Therefore, we explore actions that might be taken by the F government to separate itself from the P government. A separating equilibrium exists if the type F government offers a policy  $\tau$  such that it results in an equilibrium in which each type of government offers a distinct policy package and the foreign investor knows with certainty what type of government it is facing. Denote the characteristics of the package offered by the type  $i$  government in equilibrium by  $C^i$ . In order for a separating equilibrium to exist, the P government must prefer its payoff in the separating equilibrium,  $W^P(C^P, \pi=1)$ , to the payoff it obtains by imitating the type F government and receiving the aid,  $W^P(C^F, \pi = 0)$ .

In order for a policy instrument to be an effective signal for the type F government, it must be more costly for the type P government to use the instrument than for the type F to use it. Rodrik (1989) considers the case of a free trade government and a government that puts greater weight on tariff revenue, and shows that there are parameter values under which the free trade government may use an import subsidy to signal its type. From (9), it can be seen that an import subsidy would be a potential signal in this environment as well. An import subsidy reduces the welfare of the P government more by a greater amount than that of the F government, since the P government puts relatively greater weight on the losses of capital in the M sector. There is a tariff rate  $\hat{\tau}_0 < 0$  at which the welfare of the P government when it receives the transfer is the same as obtained when it receives no transfer and sets the

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<sup>10</sup> Given  $\tau$  free trade is the optimal policy for the free trade government from Proposition 2(b). Since  $\pi$  is constant for  $\tau \leq 0$  with these beliefs, free trade dominates any import subsidy. For  $\tau > 0$ , we have  $W^F(0,0,\pi) > W^F(\tau,0,\pi) > W^F(\tau,0,1)$ , where the first equality follows from Proposition 2b and the second follows from the fact that  $W^F$  is decreasing in  $\pi$ . This establishes that free trade is optimal.

optimal tariff. Thus, if the F government sets a tariff  $\tau \leq \hat{\tau}_0$ , the P government will not choose to imitate. The F government will choose to separate if the welfare level obtained with this import subsidy is at least as large as that attained in the pooling equilibrium.

A second type of policy would be a subsidy to foreign investment. The subsidy to foreign investment is also more costly to the P government than to the F government, because the inflow of foreign investment reduces the welfare of specific factor owners in the import-competing sector by driving up the domestic wage. In order to separate, the F government must choose a subsidy sufficiently large that the P government prefers to set its optimal tariff  $\tilde{\tau}_0^P$  than to choose free trade and the investment subsidy.

#### B. Simulations of Separating Subsidy Policies

The comparisons of welfare levels required to determine whether P government will choose to imitate the free trade policy and whether the F government will use subsidy policies to separate from the P government both require analysis of the welfare effects of discrete changes in the policy variables. Given the complexity of the model, general results will not be available by differentiation of the welfare functions. Therefore, we use simulation analysis to illustrate the effects of changes in the parameters of the model on the existence of a separating equilibrium and on the relative attractiveness of import subsidies and investment subsidies for the F government.

Table 1 illustrates the effect of the preference for protection on the part of the P government on the cost of separation for the F government when FDI is irreversible. The specific factor model was estimated assuming Cobb-Douglas production functions in each sector ( $Y_X = (Z + K_X)^{\frac{1}{2}} L_X^{\frac{1}{2}}$  and  $Y_M = K_M^{\frac{1}{2}} L_M^{\frac{1}{2}}$ ) and a welfare function  $W = \ln D_{M0} + \ln D_{X0} + \beta(\ln D_{M1} + \ln D_{X1})$ . The first column of

Table 1 shows the level of the import subsidy required for the F government to separate from the P government for a low value of the taste parameter for protection ( $\gamma = .025$ ) and a higher value ( $\gamma = .075$ ). For this exercise, the factor endowments chosen were ( $L = 100$ ,  $K_M = 15$ ,  $K_X = 25$ ), and the discount parameter  $\beta$  and world interest factor  $\delta$  were both set equal to .9. Source country returns on foreign investment were assumed to be  $r_0^* = .75$  and  $r_1^* = .7$ , with the lower second period return chosen to ensure  $Z_1 > Z_0$  for the free trade government.<sup>11</sup> The transfer from the international agency was set at .4.

Table 1: Optimal fiscal instrument for low and high preferences for protection

	Import Subsidy	Investment Subsidy
Low preference for protection ( $\gamma = .025$ )	.03  Utility: 13.1464  Subsidy cost: 0.321	.03  Utility: 13.1453  Subsidy cost: 0.247
High preference for protection ( $\gamma = .075$ )	0	0

With these parameter values, the P government chose to imitate a free trade policy when  $\gamma = .025$  but not when  $\gamma = .075$ . A separating equilibrium with free trade is obtained in the latter case and

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<sup>11</sup>Note that the  $r_i$  values represent rentals on capital (and not rates of returns). In order for investment in capital to be profitable, we must have  $r_0 + \delta r_1 \geq q$ , where  $q$  is the cost of the capital good. We treat the stock of capital as given, and do not analyze the investment problem.



there is no need to use subsidies to separate the two types of government. This is consistent with the hypothesis that separation is easier the more protectionist is the P government. The transfer from the international agency was too small in this case to make it worthwhile for the highly protectionist government to lower its tariff.

For the case when  $\gamma = .025$ , separation is not obtained with free trade. A separating equilibrium can be obtained if the F government sets an import subsidy of .03. This subsidy results in a sufficiently large reduction in the return to sector M interests that the P government is unwilling to offer the subsidy. This is consistent with Rodrik's notion that governments may be forced to liberalize more quickly than they would like in order to make their policies credible with international agencies (i.e. to convince the agencies and investors that they are really type F governments). A similar result is obtained with an investment subsidy. A subsidy of .03 to foreign investment will also achieve separation. The comparison of welfare levels with the two separation tools indicates that the welfare level of the F government is higher when it uses the import subsidy. However, the cost of the import subsidy is also higher than the foreign investment subsidy. Thus, if tax collection to finance the subsidies is high, the investment subsidy might be the preferred policy.

Table 2 shows how the level of the import subsidy required to separate varies with the factor endowments for 5 cases. Case (a) corresponds to the values from Table 1 ( $K_M = 15$  and  $K_X = 25$ ), with each of the succeeding cases obtained by simultaneously reducing  $K_M$  by 2.5 and increasing  $K_X$  by 2.5 from the previous case. Since the endowment of labor and the total endowment of specific factors ( $K_X + K_M$ ) is a constant across the cases, the level of foreign investment under free trade is the same for each case.<sup>12</sup> The larger is  $K_X$ , the greater will be the amount of exports at free trade. Cases (a)-(e) can thus

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<sup>12</sup> This follows from the fact that with the specific factors model, the market wage rate is determined by the domestic relative price of good M when sector X capital is mobile internationally. The labor market equilibrium condition can be written as

be thought of as indicating a greater degree of reliance on trade, holding the degree of foreign investment constant.

Table 2: Separating Equilibrium with Import Subsidy

	(a)	(b)	(c)	(d)	(e)
K <sub>m</sub>	15	12.5	10	7.5	5
K <sub>x</sub>	25	27.5	30	32.5	35
Free Trade Government					
Import subsidy	.03	.0269	.0225	.0158	.0075
Total Amount of subsidy	.321	.3788	.3979	.3336	.1841
im0	10.7009	14.1821	17.6833	21.1116	24.5425
ex0	13.9403	17.2323	20.7171	24.094	27.5324
im1	10.5501	14.077	17.617	21.1753	24.7463
ex1	18.8785	22.3516	25.8116	29.2532	32.6822
Z <sub>0</sub>	5.331	5.000	4.889	4.680	4.519
Z <sub>1</sub>	11.020	11.020	11.020	11.020	11.020
U	13.1464	13.1465	13.1468	13.1470	13.1471
Protectionist Government					
t <sub>0</sub>	.05711	0.6305	.07044	.07992	.09262
t <sub>1</sub>	.06687	.07517	.08597	.10073	.12241
Z <sub>0</sub>	2.682	2.818	2.986	3.198	3.475
Z <sub>1</sub>	8.947	9.071	9.227	9.433	9.721

$$(K_X + Z) \frac{a_{LX}}{a_{KX}} + K_M \frac{a_{LM}}{a_{KM}} = L$$

where  $a_{ij}$  is the requirement of factor  $i$  per unit of good  $j$ . With  $w$  determined from the competitive profit conditions, the factor ratios  $a_{Lj}/a_{Kj}$  are fixed. The level of  $Z$  will thus adjust to satisfy the labor market equilibrium condition. Under the assumption that factor intensities are the same in each sector,  $a_{LX} = a_{LM}$  and  $a_{KX} = a_{KM}$ . Therefore, changes in  $K_X$  and  $K_M$  that keep the sum of factor endowments constant will not affect labor demand, so  $Z$  is the same for cases (a) - (e) at free trade.

Table 2 indicates that as the degree of reliance on trade increases, the F government can separate itself at a lower import tariff. The reason for this can be seen by observing that the optimal tariff for the protectionist government rises as the volume of trade increases. Therefore, it will be more costly for the protectionist government to imitate the F government when the volume of trade is large. The effect of the level of  $K_x$  on the cost of the separation program is ambiguous, since a higher value of  $K_x$  means a lower import subsidy but a greater volume of imports. Interestingly, the total cost of the subsidy program initially increases with  $K_x$ , reaching a maximum at  $K_x = 30$ , and then declines.

Table 3: Separating Equilibrium with Investment Subsidy

	(a)	(b)	(c)	(d)	(e)
Km	15	12.5	10	7.5	5
Kx	25	27.5	30	32.5	35
Free Trade Government					
InvestmentSubsidy	.03	.0278	.0243	.0192	.01
Total Amount of subsidy	.247	.221	.180	.131	.0565
im0	10.1943	13.7415	17.2857	20.8415	24.4079
ex0	16.0502	19.3814	22.5853	25.6527	28.3596
im1	10.7943	14.2965	17.7997	21.3035	24.8079
ex1	18.6343	22.132	25.6289	29.1251	32.6206
Zo	8.225	7.932	7.471	6.810	5.654
Z1	11.020	11.020	11.020	11.020	11.020
U	13.1453	13.1456	13.1459	13.1464	13.1469
Protectionist Government					
t0	.05711	0.6305	.07044	.07992	.09262
t1	.06687	.07517	.08597	.10073	.12241
Z0	2.682	2.818	2.986	3.198	3.475
Z1	8.947	9.071	9.227	9.433	9.721

Table 3 illustrates the same exercise for the case of an investment subsidy. The conclusions are similar for this case. The greater is the volume of trade, the higher is the optimal tariff for the P government and the lower is the subsidy at which the F government can separate. This indicates that when the volume of trade is greater, it is more costly for the P government to imitate the free trade government, as in the case of the import subsidy. However, the cost of the investment subsidy program is monotonically decreasing in  $K_X$ . This result is due to the fact that  $Z_0$  is decreasing in  $K_X$  in the separating equilibrium, so that the subsidy involves both a lower rate and a lower level of foreign investment as  $K_X$  increases.

An interesting aspect of Tables 2 and 3 is that it reinforces the conclusion of Table 1 regarding the relative attractiveness of import subsidies and investment subsidies. Import subsidy programs result in higher utility levels in the separating equilibrium, but also in higher expenditures on subsidies. The attractiveness of import subsidies relative to investment subsidies will depend on the cost of raising additional revenues for the government.

## V. Summary

It may be helpful to summarize the major policy conclusions of the paper in an integrated form. This is the purpose of Table 4. The paper has analyzed two sources of credibility problems faced by governments: (i) investors know the government policy preferences but ignore if the government will have later an incentive to change its position (time inconsistency) and (ii) investors are uncertain about the actual government preferences and have reasons to doubt their commitment to change. In addition, investors are uncertain as to whether the government can commit or not to its policy statements.

Table 4: Optimal Trade Policy to Attract Foreign Investors

	Government Preferences are known by investors	Government Preferences are not known by investors
<b>Government can commit</b>		
<b>Reversible investment</b>	Free Trade	Free Trade (unless clear preference for domestic producers)
<b>Irreversible investment</b>	Free Trade	Free Trade (unless clear preference for domestic producers)
<b>Government cannot commit</b>		
<b>Reversible investment</b>	Free Trade	Do whatever government prefers
<b>Irreversible investment</b>	Tax imports once investment made	<ul style="list-style-type: none"> <li>• If government is protectionist: tax imports</li> <li>• if government is free trade oriented: subsidize investment or imports</li> </ul>

These two dimensions offer four optimal strategies for the government as seen in Table 3. The issue is however somewhat trickier as in some cases, the optimal government strategy may also depend on whether the foreign investment decision is irreversible or not.

In a nutshell, if investors know the government preferences, they also know that the optimal strategy for the government will generally be free trade. In particular, if a government can commit to its policy statements, the usual recommendation of free trade prevails. This is a reassuring result confirming the standard results of traditional trade theory.

The most interesting result of the paper however is obtained for the most realistic case in which a government cannot commit, in particular when investment is irreversible. In this more realistic case, this model suggests that the conventional theoretical wisdom can be misleading because the optimal strategy to follow is generally to tax imports when the current government preferences are clearly known

to investors. When investors do not know the government type however and free trade oriented governments want to separate themselves from the crowd, a zero tariff will not be enough for governments who want to signal their commitment to change. It will cost them and they will have to subsidize investment or imports if they want to be able to attract FDI. The fastest way to attract FDI is an investment subsidy but it is also the most costly, which may be an important consideration for a reforming government trying to keep the fiscal situation under tight control.

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